Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

(1) Review of current real-time departmental and hospital COVID-19 statistics and trends
(2) Formal case presentations and expert discussion
(3) Key teaching points from latest clinical recommendations
(4) Updates from prior conference's cases

3. Results

Five ED CCC have been completed. Attendance grew from approximately 50 attendees for the first conference to greater than 100 participants. Clinical management topics covered within case presentations have included the following: characteristics of respiratory compromise in COVID-19 patients and how this differs from typical respiratory failure identification and management; decision making surrounding admission versus discharge of COVID-19 patients; decision making related to BiPAP and CPAP; pharmacologic management considerations and toxicities related to COVID-19 medications; staff safety and utilization of physical ED space; patient and family experience concerns; and clinician and staff wellness.

Thematic analysis of the questions posed and topics discussed in the Zoom® chat function revealed several frequently-referenced areas of interest, including medication initiation recommendations; disposition and decision-to-admit considerations; clinician and staff wellness and burnout prevention, particularly related to the safety of their families; and departmental and hospital workflows (inclusive of triage concerns).

3.1. Feedback

Feedback from participants has been overwhelmingly positive, including direct feedback to the conference organizer by email and in person Participants report being particularly appreciative of guidance surrounding appropriate laboratory testing, medication management, and disposition planning. Initial feedback suggested that a major area of improvement would be to include community affiliate ED staff. A more formal feedback process via secure online survey software has been initiated to allow for anonymous recommendations of topics to be covered or areas for iterative improvement.

3.2. Challenges

There have been several obstacles to overcome in launching the CCC under such dynamic circumstances. First, given that the conference needed to be held virtually, typical privacy considerations were made more challenging. To overcome this and gain legal approval to continue, all conferences are password protected and standard peer review protected disclaimers are provided both in conference invitations and at the start of each individual conference. Second, with growing numbers of participants across all ED role groups, management of discussants has become increasingly challenging. To mitigate this, all lines are muted by the host at the onset of each conference, and a predetermined smaller group of discussants provides commentary at various points throughout the hour. Other participants are asked to provide comments and questions in the chat function as previously discussed.

3.3. Growth considerations

After pilot testing the CCC format with the faculty group only, the conference was broadened to include all ED clinical role groups in its second week. In an effort to incorporate feedback that staff working in community affiliates would benefit from the conference's content, these groups were included as of April 3, 2020 after obtaining hospital leadership and legal approval. Next steps include increased involvement of expert discussants from outside emergency medicine, including infectious disease and critical care specialists. Initial discussions are also underway regarding the feasibility of inviting participants from other specialties to view livestreams of the conferences, and possibly to create a repository of content for future learners.

4. Conclusion

The 2020 COVID-19 pandemic may be the largest acute challenge ever faced by EDs in the United States. Leveraging existing Q&S infrastructure and communication tools has been critical in keeping frontline staff informed regarding up-to-date clinical management recommendations. Importantly, there has been a secondary interpersonal benefit of the ED CCC, as staff have appreciated the ability to come together – albeit virtually – for support and discussion during a time where many report feeling isolated and fearful. As this public health crisis unfortunately grows, we plan to continue the ED CCC indefinitely, incorporating iterative changes based on ongoing feedback and circumstances.

Jonathan D. Sonis MD, MHCM*
Lauren Black RN, MS
Joshua Baugh MD
Theodore I. Benzer MD, PhD
Bryan D. Hayes PharmD
Ali S. Raja MD, MBA, MPH
Benjamin A. White MD
Susan R. Wilcox MD
Brian J. Yun MD, MBA, MPH
Department of Emergency Medicine, Harvard Medical School, Massachusetts General Hospital, Boston, MA, United States of America
*Corresponding author at: Harvard Medical School, Massachusetts General Hospital, Department of Emergency Medicine, Founders 850, Boston, MA 02114, United States of America.
E-mail address: jonathan.sonis@mgh.harvard.edu.

Emily L. Aaronson MD, MPH
Department of Emergency Medicine, Harvard Medical School, Massachusetts General Hospital, Boston, MA, United States of America
Lawrence Center for Quality and Safety, Massachusetts General Hospital, Boston, MA, United States of America

4 April 2020

https://doi.org/10.1016/j.ajem.2020.04.021

Areas of academic research with the impact of COVID-19

The SARS-CoV-2 virus has significantly affected the health, economy, and socio-economic fabric of the global society. The costs involved in the containment and treatment of this infectious disease are exorbitantly high, which even the wealthiestand developed countries are finding it difficult to sustain. COVID-19 pandemic has severely impacted the crude, stock market, gold and metals and almost all areas of the global market [1]. Large research laboratories and corporate houses are working with a high speed to develop medicines and vaccines for the prevention and treatment of this dreaded disease. To deal with these current health management challenges, we need a comprehensive understanding of the effect on the health system, global business, and culture. COVID-19 was declared a pandemic by the WHO on 11th March 2020 [2]. COVID-19 has become an international emergency in a short period and will have long-lasting effects. There is an urgent need to identify and study the areas of academic research which will be impacted by COVID-19 [3].

Table 1
Major research areas which will be impacted by COVID-19.

S. No	Areas	Description
1	Vaccine Development	• Development of various antibodies which provide immunity for COVID-19 • Various research organizations and pharmaceutical companies are trying to develop COVID 19 vaccine • The first vaccine may be ready by China at the end of April 2020, and clinical trials have begun • TJM2 by I-Mab Biopharma is the vaccine which is developed for the treatment of a patient suffering from the Coronavirus infection
2	Medication/Therapy	• Hydroxychloroquine and Azithromycin have been claimed to be effective in prevention and treatment, in some anecdotal case series and in-vitro • Certain retroviral drugs (used for the treatment of HIV) are being considered as a promising therapy • Provide education of the disease and medication to ensure having the correct treatment • Personal medication record, documentation and its action during medication are required
3	Health Care and equipment	• Research is going on for the essential medical equipment to fulfil the crisis of COVID-19 • Various equipment like surgical masks, protective gear,sanitizer, andventilators must be available to all on time • There is a requirement of protective clothing which meets the required medical standards • Test kit for this virus must be provided inaccurate time to avoid further delay
4	Social	• Social distance should be maintained to avoid the further cause of infection and controlling of this disease • People gathering like a party, festival, and marriage must be avoided • Social research must be establishedfor the knowledge and conducting a new inquiry • Back to joint family systems • Avoid cinema, gymnasiums, swimming pools and support clubs
5	Economic	• Almost all manufacturing sectors are affected, and the whole supply chain is disrupted among all affected countries • Travel & tourism industry • Due to the closing of all market, business, and software companies, the economy is directly affected • Mostly affected are the people who can earn their money at daily wages, lower middle class • Research must be required on how to uplift the economy • Poverty and hunger
6	Environmental	• Overall air pollution is getting reduced by this virus which has a positive impact on the environment • Climate change and industrialization • Energy-efficient devices • Lower carbon is required in future which can make less drasticchanges in manufacturing requirements
7	Sustainability	• Fulfil the environmental, economic and social profit of the people • Improve productivity and sustainable medical business and supply chain • Sustainable supply chain, organizations, healthcare
8	Psychiatric	• COVID-19 creates mental illness among the people who can further cause depression • To know how people can keep happy in their homes which can make better treatment of a mental disorder • Work to handle the ongoing stress, situation and other psychosocial disabilities • Proper positive communication and accurate information required among the people
9	The emergence of a new workplace and work culture	• The proper new workplace is required to complete the ongoing work which can prevent to spread this virus • Manage all meeting and events with proper precautions or better to conduct it online • Audio, video conferencing, WhatsApp group can be followed for discussion • Avoid face to face meeting and successfully replace it with online events or teleconference to prevent any type of infection
10	Information Technology revolution	• New learning modules by discussion through email, online forums • Conducting online classes from homes through internet facilities • Conducting virtual labs through online video and other supporting materials
11	Online awareness workshop and capacity building	• Conducting online workshop of COVID-19 to provide awareness among the masses • Students teaching and learning process can be conducted online by the teacher to complete their class syllabus • Regular touch with internet to update the information, precaution and treatment of this disease • Need to train paramedics, secondary/-tertiary head worker and ramping up the capacity
12	Biological warfare	• In-depth research on infections and biological toxins such as virus, bacteria, insects and fungi • Number of other infections, diseases that can affecthuman life and become pandemic • Fighting with the biological enemies • The emergence of new weaponry and defence systems
13	Psychological issues	• Psychological effects of the virus • The mental health of the peoples after lockdown • The acute need for counselling • The stigma of disease and mechanisms to overcome • In this area, there is a lesser amount of data is available, so research must be carried in this area to reduce the depression and psycho diseases
14	Industry 4.0	• Industry 4.0 is the fourth industrial revolution used new advance manufacturing and advance technologies • Use new technologies for automatic tracking of COVID-19 patient and its analysis • Artificial intelligence (AI) based technologies to keep data of the patient to identify the diseases and through geo-fencing, proper tracking • Use of AR, VR and Holography for training, and capacity building • Helping prevention of unexpected outcome • Digital recordkeeping and analysis for healthcare management
15	Importance of home life	• The emergence of work-from-home culture • Balance of personal and professional time • The family value system and relationships • New architecture and design and town planning for sustainable life
16	Global trade, commerce	• Local production vs global sourcing • Digital currency, international and national trade • New trade partners • Fairtrade, ethical trade

Table 1 (*continued*)

S. No	Areas	Description
17	Medical Supply chains	• Evolution of Risk resilient supply chains for PPE (Personal Protection Equipment) like masks, ventilators etc. • The emergence of quick response transportation and logistics enabled by IT in PPE • Humanitarian logistics with collaborative efforts from various academic entities • Role of the disaster management group
18	Public health and Policy	• Issues of managing public health systems, especially given current infrastructure and our ability to manage the same • Role of state vis-à-vis private sector • Public Policy on Affordable medical care, especially to disadvantaged sections of society

1. Research objectives

This manuscript highlights potential areas of academic research which are likely to be impacted by COVID-19. The main objectives of this paper are to provide awareness and to identify the research areas related to COVID-19. It may help improve the understanding of this disease and describe the psychological impacts of this pandemic and how these could change as the disease spreads.

2. Current limitations and gaps in the knowledge of Coronavirus and its effects

It appears the Coronavirus is zoonotic and originated in China. Scientists have not yet been able to identify the animal source of the infectious agent and have not determined whether a persistent animal reservoir of the infectious agent exists. It is also unclear whether SARS, like influenza, is a seasonal disease that would have receded on its own. It remains to be seen whether it will reemerge on a seasonal basis, and if so, how virulent future manifestations would be. The answers to these questions would undoubtedly advance the world's ability to predict and prepare for a resurgence of COVID-19.

3. Significant research areas on COVID-19

COVID-19 has disrupted the economies and the lives of individuals around the world. There are many areas of research needed regarding COVID-19 [4–6]. Table 1 identifies significant research areas which be profoundly impacted by this pandemic. We need to undertake extensive research on these areas.

Extensive research is required for the development of a vaccine for the prevention of Coronavirus infection. There is an urgent need for early production and manufacturing of the essential items like personal protective equipment, medicines, and ventilators to combat this pandemic. All measures to keep a social distancing by the public must be ensured by avoiding social-cultural and religious programs and festivals etc. during this pandemic. Along with these, healthcare measures to deal with COVID-19 pandemic, there is also an imminent requirement for theresearch to improvethe global economy, which has taken a tremendous beating and is unlikely to recover in the near future [7,8].

4. Conclusion

COVID-19 pandemic is a public health emergency of international concern.It has posed new challenges to the global research community. With the help of academic research, there is a need for a better understanding of the COVID-19 and its socio-economic ramifications on society. The future research will be multi-disciplinary and trans-national. We see a new wave of research in the biological and the medical sciences for the well-being of the civilization.

Declaration of competing interest

None.

Abid Haleem
Mohd Javaid
Department of Mechanical Engineering, Jamia Millia Islamia, New Delhi, India
*Corresponding author.
E-mail address: mjavaid@jmi.ac.in.

Raju Vaishya
Department of Orthopaedics, Indraprastha Apollo Hospital, Sarita Vihar, Mathura Road, 110076 New Delhi, India

S.G. Deshmukh
Department of Mechanical Engineering, Indian Institute of Technology Delhi, New Delhi, India

30 March 2020

https://doi.org/10.1016/j.ajem.2020.04.022

References

[1] Xiang YT, Li W, Zhang Q, Jin Y, Rao WW, Zeng LN, et al. Timely research papers about COVID-19 in China. The Lancet 2020. https://doi.org/10.1016/S0140-6736(20)30375-5.
[2] Coronavirus has become a pandemic, WHO. Says. 11th march 2020. New York Times. https://www.nytimes.com/2020/03/11/health/coronavirus-pandemic-who.html.
[3] Gilbert M, Pullano G, Pinotti F, Valdano E, Poletto C, Boëlle PY, et al. Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. The Lancet 2020;395(10227):871–7.
[4] . Coronavirus research and SARS. Learning from SARS: Preparing for the next disease outbreak: Workshop summary. National Academies Press (US); 2004.https://www.ncbi.nlm.nih.gov/books/NBK92490/.
[5] Gao J, Tian Z, Yang X. Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. Biosci Trends 2020. https://doi.org/10.5582/bst.2020.01047.
[6] Chinazzi M, Davis JT, Ajelli M, Gioannini C, Litvinova M, Merler S, y Piontti AP, Mu K, Rossi L, Sun K, Viboud C. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. Science. 2020; DOI: https://doi.org/10.1126/science.aba9757.
[7] Wilder-Smith A, Chiew CJ, Lee VJ. Can we contain the COVID-19 outbreak with the same measures as for SARS? Lancet Infect Dis 2020. https://doi.org/10.1016/S1473-3099(20)30129-8.
[8] Johnson HC, Gossner CM, Colzani E, et al. Potential scenarios for the progression of a COVID-19 epidemic in the European Union and the European Economic Area, March 2020. Euro Surveill 2020;25(9):2000202. https://doi.org/10.2807/1560-7917.

The role of emergency medical services in containing COVID-19

To the editor,

The number of worldwide cases of COVID-19 has exceeded one million. The approach of the World Health Organization has emphasized the role of containment of the virus [1] in the context of countrywide operational planning [2]. Emergency medical services (EMS) can play a significant role in designing and implementing an effective approach.

Magen David Adom (MDA) is the Israeli national EMS organization (8.9 million residents). Dispatch is overseen by the National Medical Emergency Dispatch Center (NMEDC). Routinely MDA is responsible for operating over 1000 ambulances, 2500 salaried workers and 24,000 volunteers. By the end of January 2020, the Israeli Ministry of Health